

Summary of Interlocks and Detector Protection, Layer 0 50% Test

1. **Detector Bias** – Silicon detectors can be damaged by supplying excessive voltage to the devices or allowing excessive bias current to flow. Permanent damage may be incurred for bias voltages above 500 Volts. Bias voltage is supplied by Bi-Ra HV modules that were used for tracking and calorimeter bias for D0 during runs 1 and 2a. These devices have a hardware voltage limit and a current trip set via software. We describe both the procedural and hardware safety.

Hardware

- Set V_{trip} on the front panel of each bias supply to 250 V. Check by hand. Record on checklist.

Software and Procedure

- Set I_{trip} (software) to 2 μa .
- Check that V_{bias} has the correct values by DVM.
- Verify current trip using a resistor test card at the adapter card
- Ramp each channel to $(1/4, 1) \times V_d$. $V_d = 200\text{V}$

2. **Low Voltage Supplies** – Excessive current on the analog supplies can endanger SVX chips mounted on ladders and wedges. In the worst case excessive current draws (above 1 amp/bond) can vaporize wirebonds. The interface card has been designed to detect and avoid any such problem.

Hardware

- The interface card has circuitry that will trip all supplies (AVDD, AVDD2, DVDD, BIAS) if an overcurrent (>0.75 amps) condition is detected on any analog SVX chip supply.

Procedure

- Measure analog voltages at the adapter card
- Record currents during initial cabling, monitor currents as part of the run checklist.

3. **Environment** – The detector needs to be operated within the appropriate environment. Detectors and cooling lines need to be safely above the dewpoint to avoid condensation. Devices also need to be kept within an acceptable temperature range (below ~ 50 deg C) to avoid physical damage due to thermal effects in the structure and epoxies. The detector will be operating in a closed dry gas environment.

Hardware

- Each module has an RTD which provides an individual temperature measurement. There is a hardware interlock at the interface board which will turn off the analog supplies on a module by module basis if a threshold temperature (40 deg c) is exceeded.

- There is a humidity interlock that will turn off the chiller and power supplies if the dewpoint is above -10 deg C.
- Analog voltages and the chiller will be tripped if proper flow is not sensed in the cooling lines or any active RTDs on the support structure read above 40 deg. C.

Procedure

- Check RTD trip level using a resistor at the adaptor card.
- Ensure that ONLY the proper RTD trips are disabled. (For modules missing RTDs)
- Record dew point, structure temperature, and selected module temperatures in run checklist